United States Department of Agriculture
Soil Conservation Service
P.O. Box 2890
Washington, D.C.
20013

NATIONAL SOIL TAXONOMY HANDBOOK
430-VI
ISSUE NO. 15

Purpose. To distribute current amendments to Soil Taxonomy, Agriculture Handbook 436.

Effective Date. These amendments and revisions are effective upon receipt.

Filing instructions. File this copy of the changes in the 3-ring binder with Issues Nos. 1 through 14. It is suggested that you keep this binder with the Soil Taxonomy volume for easy reference.

Replace 615 "Contents" dated January 1991 with the enclosed pages of Soil Taxonomy" dated January 1991 with the enclosed pages v to vii of the index. Replace page 615-395 dated January 1991 with page 615-395 dated August 1991 and file pages 615-396 to 615-422 following page 615-395.

Supplementation. States and NTC's may not supplement the handbook.

Rick R. Shaw

Part 615 - Amendments to Soil Taxonomy

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Part 615 - Amendments to Soil Taxonomy

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615.67	As applicable throughout Soil Taxonomy

NSTH 615.62, page 615-326, column 1, line 2 (*Soil Taxonomy* page 291). Delete "tonguing" and replace with "a glossic horizon".

Page 291, column 2, line 1. Delete "tongue or", and following "do not have" add "a glossic horizon or".

Page 291, column 2, line 57. Delete "or tongues", and following "in the form of" add "a glossic horizon or".

NSTH 615.62, page 615-341, item HFBE (*Soil*

615.62, Page 615-328, item HGBF, line 1 (*Soil Taxonomy* page 296). Change "40 cm" to "50 cm".

615.62, Page 615-359, CAEG, item 2 (*Soil Taxonomy* page 339). Change item 2. to read as follows:

"2. In more than 50 percent of each pedon, a spodic horizon in which all subhorizons have a ratio of free iron (by dithionite-citrate) to carbon (both elemental) of 0.2 or more."

615.62, Page 615-363, column 1, line 38 (*Soil*

615.67 SI units

Throughout *Soil Taxonomy*, to conform to the standards for using SI units, the following conversions have been made:

CEC and ECEC:

1 meq/100 g soil = 1 cmol(+) per kg soil

Conductivity:

1 mmho/cm = 1 dS per m

Pressure:

15-bar water = 1500 kPa water retention

1/3-bar water = 33 kPa water retention

615.68 Organic carbon and 1500 kPa water retention

In *Soil Taxonomy* the percentage of clay in poorly dispersing soils has been estimated by the formula "clay equals 2.5 or 3 times 1500 kPa water retention." The organic carbon in the soils in the National Soil Survey Laboratory data base appears to hold about 100 percent of their dry weight in water at 1500 kPa. To correct for water held by the carbon the following changes are made:

NSTH 615.38a, p. 615-52, Genesis, line 10 (*Soil Taxonomy* p. 27). Delete "(The percentage of clay is measured by the pipette method or 2.5 times 15-bar water, whichever is higher but not more than 100.)" and replace with "(The percentage of clay is either measured by the pipette method, or estimated to be 2.5 times [percent water retained at 1500 kPa tension

Page 384, column 1, footnote. Change first sentence to read as follows: "If the ratio of (percent water retained at 1500 kPa tension minus percent organic carbon) to the percentage of measured clay is 0.6 or more in half or more of the control section, then the percentage of clay is considered to be 2.5 times (percent water retained at 1500 kPa tension minus percent organic carbon), but no more than 100."

Page 387, footnote 1. Change footnote to read as follows: "Percentage of clay or 2.5 times (percent water retained at 1500 kPa tension minus percent organic carbon), whichever value is higher (but no more than 100), if the ratio of (percent water retained at 1500 kPa tension minus percent organic carbon) to the percentage of measured clay is 0.6 or more in half or more of the control section."

615.69 Cambic horizon with oxic properties

The following changes are made to the cambic-horizon definition so that a horizon with oxic properties that is too thin to be an oxic horizon can be included in the definition of a cambic horizon.

Page 34, column 2, line 47. After "brownish" add "and the cambic horizon may have few weatherable minerals".

Page 36, Summary of properties, items 3 & 5 (see also NSTH Issue No. 11, p. 617-111). Delete item 3 and change item 5 to read as follows: "5. Properties that do not meet the requirements for an argillic, kandic, oxic, or spodic horizon;". Renumber items 4-7 as 3-6.

Page 129, column 2, Hapludalfs, Definition. Change item 4 to read as follows:

"4. Have *either* a lithic or paralithic contact within 150 cm of the soil surface; *or* have a clay distribution such that the clay content decreases with depth by 20 percent or more from its maximum within 150 cm of the soil surface, and if there is a clay increase of 3 percent or more (absolute) below that layer, less than 5 percent of the volume in the layer where the clay content decreases consists of skeletans on faces of peds, if:

a. [No change]

b. [No change]

c. [No change]"

Delete all of item d.

Page 138, column 2, Haplustalfs, Definition. Change item 6 to read as follows:

"6. Have *either* a lithic or paralithic contact within 150 cm of the soil surface; *or* have a clay distribution such that the clay content decreases with depth by 20 percent or more from its maximum within 150 cm of the soil surface, and if there is a clay increase of 3 percent or more (absolute) below that layer, less than 5 percent of the volume in the layer where the clay content decreases consists of skeletans on faces of peds, if:"

Change "(1)" to "a." (Leave text as is)

"5. Have *either* a sandy or loamy particle-size class in the upper part of the argillic horizon; *or* an increase of less than 20 percent clay (absolute) within a vertical distance of 7.5 cm and of less than 15 percent within 2.5 cm of the upper boundary of the argillic horizon; *or* have a lithic or paralithic contact within 50 cm of the soil surface."

615.72 Argic subgroups of Psamments

The following changes, which were recommended by the Southern Regional Soil Taxonomy Committee and reviewers of the proposal, are made to the suborder of Psamments.

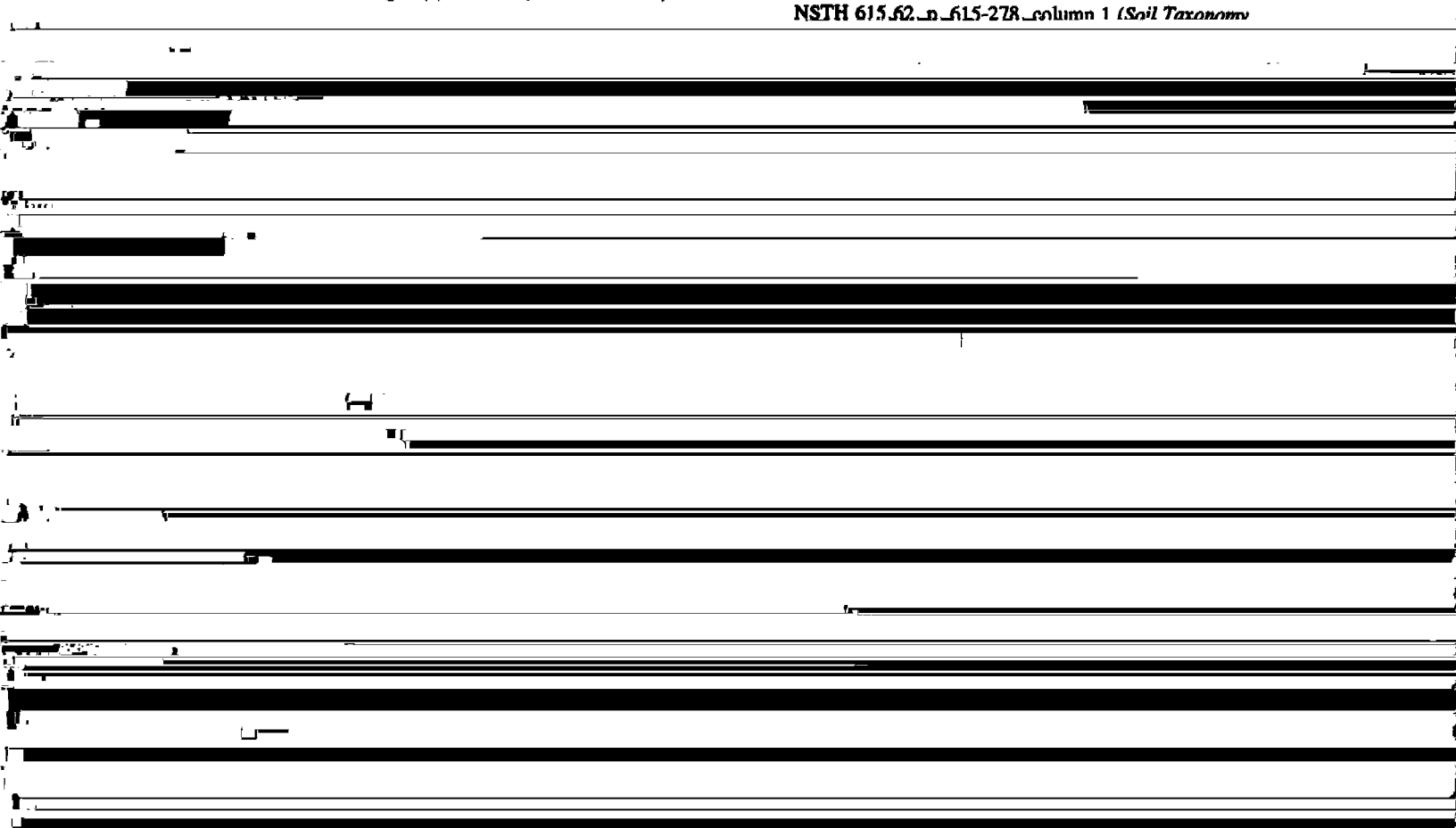
Page 87, column 1, line 4 of text. After "required." add the following sentences: "An exception is the adjective *argic* when used in great groups of Psamments. Rather than intergrading to one specific taxon, argic subgroups intergrade to orders which have argillic horizons, specifically Alfisols and Ultisols."

NSTH 615.62, p. 615-277, column 1, item KCAE (*Soil Taxonomy* p. 202). Change "150 cm" to "200 cm", and change "Alfic Cryopsamments" to "Argic Cryopsamments".

NSTH 615.62, p. 615-277, column 2, Definition of Typic Cryopsamments, item 1 (*Soil Taxonomy* p. 202). Change "150 cm" to "200 cm".

Page 203, column 1, line 8. Change "Alfic Cryopsamments" to "Argic Cryopsamments".

NSTH 615.62, p. 615-278, column 1 (*Soil Taxonomy*



"KCCH. Other Quartzipsamments that have

"7. Do *not* have lamellae within 200 cm of the soil surface that meet all requirements for an argillic horizon except thickness or clay content."

Page 204, Description of subgroups, column 2. Between "Aquic Quartzipsamments" and "Haplaquodic Quartzipsamments" add the following:

"**Argic Quartzipsamments.**--These soils have a udic moisture regime and have lamellae within 200 cm of the soil surface that are too thin, too few, or have too little clay to meet the requirements for an argillic horizon. Because of the lamellae, these soils have more moisture available for deeply rooted plants such as trees and perennial grasses than Typic Quartzipsamments.

Argic Ustic Quartzipsamments.--These soils have an ustic moisture regime and have lamellae within 200 cm of the soil surface that are too thin, too few, or have too little clay to meet the requirements for an argillic horizon. Because of the lamellae, these soils have more moisture available for deeply rooted plants such as trees and perennial grasses than other Quartzipsamments with an ustic moisture regime."

NSTH 615.62, p. 615-279, column 2 (*Soil Taxonomy* p. 207). Change item KCGC to read as follows:

"KCGC. Other Ustipsamments that have lamellae within 200 cm of the soil surface that meet all the requirements for an argillic horizon except thickness[4] or clay content.

Argic Ustipsamments"

NSTH 615.62, p. 615-280, column 1. Delete all of item KCGD and change item KCGE to KCGD.

NSTH 615.62, p. 615-280, first column, Definition of Typic Ustipsamments. Change item 1 to read as follows:

"1. Do not have lamellae within 200 cm of the soil surface that meet all the requirements for an argillic horizon except thickness[5] or clay content."

Page 207, column 2, Description of subgroups. Delete "Alfic Ustipsamments" and description and substitute the following:

"**Argic Ustipsamments.**--These soils have within 200 cm of the soil surface lamellae that meet all the requirements for an argillic horizon except thickness or clay content. The epipedon should not have the color of a mollic epipedon because this would indicate an intergrade to Argiustolls."

NSTH 615.62, p. 615-279, column 2 (*Soil Taxonomy*

NSTH 615.62, p. 615-280, column 2 (*Soil Taxonomy*

"KCDD. Other Udipsamments that have lamellae within 200 cm of the soil surface that meet all the requirements for an argillic horizon except thickness[3] or clay content.

Argic Udipsamments"

"KCFE. Other Xeropsamments that have lamellae within 200 cm of the soil surface that meet all the requirements for an argillic horizon except thickness[6] or clay content.

Argic Xeropsamments"

615.73 Corrections resulting from Oxisol Amendment

The changes made in the Oxisol order in NSTH Issue No. 11 make the following corrections necessary: Orthoxic subgroups are renamed *udoxic* subgroups, and the limits between Inceptisols and Oxisols are redefined.

NSTH 615.62, p. 615-278, column 1, item KCCF. Change subgroup modifier "Orthoxic" to "Udoxic".

Page 204, Description of subgroups, column 2. Change "Orthoxic Quartzipsamments" to "Udoxic Quartzipsamments", and in line 2 of the description, change "all requirements" to "the CEC requirements".

Page 204, Description of subgroups, column 2, Ustoxic Quartzipsamments. In line 3 of the description, change "all the qualitative requirements" to "the CEC requirements".

Page 229, column 2. Change item 6 to read as

mollic epipedon or separates horizons that together meet all the requirements for a mollic epipedon; *and*

2. An argillic or natric horizon; *and*

3. Characteristics associated with wetness, namely mottles or iron-manganese concretions, within 100 cm of the soil surface in the albic and/or the argillic or natric horizon.

Albolls, p. 273"

615.75 Albic Argiborolls

This subgroup is being deleted because it is very narrowly defined and has never been used. The properties of these soils are very similar to those of either Albolls or Abruptic Udic Argiborolls, both of which have higher priority in the keys than Albic Argiborolls.

NSTH 615.62, p. 615-317, column 2, and top of p.

value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

2. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon.

Boralfic Argiborolls"

NSTH 615.62, p. 615-319, Definition of Typic Argiborolls. Change item 2 to read as follows:

"2. Do *not* have *either*:

a. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

b. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon."

NSTH 615.62, p. 615-320 (*Soil Taxonomy* p. 286). Change item HEBA to read as follows:

"HEBA. Other Cryoborolls that have the following combination of characteristics:

1. An argillic horizon; *and*

2. A lithic contact within a depth of 50 cm of the soil surface; *and either*

a. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

b. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon.

Boralfic Lithic Cryoborolls"

NSTH 615.62, p. 615-321 (*Soil Taxonomy* p. 286). Change item HEBM to read as follows:

"HEBM. Other Cryoborolls that have an argillic horizon; *and either*

1. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

2. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon.

Boralfic Cryoborolls"

NSTH 615.62, p. 615-322, Definition of Typic Cryoborolls (*Soil Taxonomy* p. 287). Change item 8 to read as follows:

"8. Do *not* have *either*:

a. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

b. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon."

NSTH 615.62, p. 615-333 (*Soil Taxonomy* p. 300). Change item HFEI to read as follows:

"HFEI. Other Argiustolls that have a mean annual soil temperature lower than 10^{o} C; *and either*

1. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

2. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon.

Boralfic Argiustolls"

NSTH 615.62, p. 615-333 (*Soil Taxonomy* p. 300). Change item HFEJ to read as follows:

"HFEJ. Other Argiustolls that have *either*

1. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

2. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon.

Ustalfic Argiustolls"

NSTH 615.62, p. 615-333. Change item 4 to read as follows:

"4. Do *not* have *either*:

a. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

b. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon."

NSTH 615.62, p. 615-344 (*Soil Taxonomy* p. 311). Change item HDEG to read as follows:

"HDEG. Other Argiustolls that have a mean annual soil temperature lower than 10° C; *and either*

1. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

2. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon.

Boralfic Argixerolls"

NSTH 615.62, p. 615-345, Definition of Typic Argixerolls. Change item 2 to read as follows:

"2. Do *not* have *either*:

a. An albic horizon, or another horizon above the argillic horizon that has a color value too high for a mollic epipedon and chroma too high for an albic horizon; *or*

b. A glossic horizon, interfingering of albic materials in the upper part of the argillic horizon, or skeletans of clean silt and sand covering more than half the ped faces in the upper 5 cm or more of the argillic horizon."

615.77 Troporthods

No subgroups for Troporthods were developed because the great group was not known to occur in the United States; however, soils classifiable as Troporthods have been mapped along the coast of Oregon. Rather than establishing subgroups, though, it has been decided to drop the great group of Troporthods altogether, in keeping with the general recommendation to drop all tropic great groups throughout *Soil Taxonomy*. The soils in question can now be classified as Haplorthods with an *iso* temperature regime.

Page 87, Table 7, column 2, Great group. Delete "Troporthods".

Page 343, column 1, Key to great groups (letter B changed to C by NSTH Issue No. 13). Delete all of item CDD and change CDE to CDD.

Page 347, column 2. Delete section on Troporthods.

615.78 Strongly contrasting particle-size classes

The introduction to the section on strongly contrasting particle-size classes is amended to clarify in what way strongly contrasting particle-size classes are used, especially in the case of soils where a particle-size class name can be applied to one part of the control section and a substitute class name to the other part.

Page 385, column 2, Strongly contrasting particle-size classes. Delete paragraphs 1 and 2, from "Strongly contrasting particle-size classes" through "between them is less than 12.5 cm thick:", and replace with the following:

"**Strongly contrasting particle-size classes**

In general, the weighted average particle size of the whole control section determines the family particle-size class differentia used in classifying a soil, and the whole control section is also considered with soils for which substitute class names are used. If a particle-size class name applies for one part of the control section but a substitute class name for the other part, the name for the thicker part is used in classifying the soil.

However, if the particle-size control section consists of two parts with particle-size or substitute classes that are strongly contrasting, as listed below, and the transition zone between the two is less than 12.5 cm thick, both class names are used. For example, if the weighted average particle size of the control section's upper part is loamy fine sand and that of the lower part is clay, with a transition zone of less than 12.5 cm, the family particle-size class differentia of that soil is *sandy over clayey* ("sandy" including fine sand as well as coarser sands). If the control section contains more than one pair of the strongly contrasting classes listed below, then the pair of classes that contrast most strongly is used in classifying the soil; however, substitute class names are used only if the materials to which they apply extend 10 cm or more into the upper part of the particle-size control section.

The following particle-size or substitute classes are considered strongly contrasting if the transition zone between them is less than 12.5 cm thick:"

615.79 Definition of *ashy over medial* and *medial over ashy* families

New limits are set for the *ashy over medial* and *medial over ashy* families. Many soils with andic soil properties have a 1500-kPa-water content of between 10 and 15 percent in dried samples of the fine-earth fraction in the particle-size control section. These soils have no apparent strongly contrasting particle-size classes, but many of the soils meet the criteria for the *ashy over medial* or *medial over ashy* families. The following limits are set to solve this problem in family classification.

NSTH 615.60, p. 615-207, column 1 (*Soil Taxonomy* p. 385). Change item 4 to read as follows:

"4. *Ashy over medial* if the water content at 1500 kPa tension in dried samples of the fine-earth fraction is 10 percent or less for the ashy

materials and 15 percent or more for the medial materials."

NSTH 615.60, p. 615-207, column 2. Change item 39 to read as follows:

"39. *Medial over ashy* if the water content at 1500 kPa tension in dried samples of the fine-earth fraction is 15 percent or more for the medial materials and 10 percent or less for the ashy materials."

NSTH 615.60, p. 615-207, column 1, Strongly contrasting particle-size classes. Renumber items 12-54 as 11-53.

615.80 Series control section

The series control section is expanded to allow more flexibility in differentiating soil series and more consistency in correlation in order to meet the interpretation needs of agronomists, foresters, engineers, and other users.

Page 391, column 1, Control section in differentiation of series. Delete the sections labeled "Cryic soils," "Very shallow soils," and "All other mineral soils," and replace with the following:

"**Soils with permafrost.**—The series control section for soils that have permafrost within 150 cm of the mineral soil surface extends from the soil surface to the *shallowest* of the following:

1. A lithic or petroferric contact; *or*

2. 100 cm if depth to permafrost is less than 75 cm; *or*

3. 25 cm below the top of the permafrost if depth to permafrost is 75 cm or more; *or*

4. 25 cm below a paralithic contact; *or*

5. 150 cm.

All other mineral soils.—The series control section for all other mineral soils extends from the soil surface to the shallowest of the following:

1. A lithic or petroferric contact; *or*

2. 25 cm below a paralithic contact or 150 cm from the soil surface, whichever is shallower, if there is a paralithic contact within 150 cm; *or*

3. 150 cm, if the bottom of the deepest diagnostic horizon is less than 150 cm from the soil surface; *or*

4. The bottom of the deepest diagnostic horizon or 200 cm, whichever is shallower, if the bottom of the deepest diagnostic horizon is more than 150 cm from the soil surface."

615.81 Kandic horizon

To clarify the description and definition of the kandic horizon, the following changes are made:

NSTH 615.38(a), p. 615-52, Genesis. At the end of sentence 1, following "KCl-extractable Al)", add "in 50 percent or more of the soil volume in the upper 100 cm or to a lithic, paralithic, or petroferric contact, if shallower"

NSTH 615.38(a), pp. 615-55/56. Delete the "Summary of properties" and replace with a revised summary as follows:

"Summary of properties

The kandic horizon:

1. Is a vertically continuous subsurface horizon that underlies a coarser-textured surface horizon. The minimum thickness of the surface horizon is 18 cm after mixing, or 5 cm if the textural transition to the kandic horizon is abrupt and there is no lithic, paralithic, or petroferric contact within 50 cm.

2. Has its upper boundary

a. At the point where the clay content, increasing with depth within a vertical distance of 15 cm or less, amounts to *either*

(1) At least 4 percent (absolute) more than in the surface horizon, if that horizon has less than 20 percent total clay; *or*

(2) At least 1.2 times as much as in the surface horizon, if that horizon has 20 to 40 percent total clay; *or*

(3) At least 8 percent (absolute) more than in the surface horizon, if that horizon has more than 40 percent total clay; *and*

b. At a depth *either*

(1) Between 100 cm and 200 cm from the mineral soil surface, if the particle-size class throughout the upper 100 cm is sandy; *or*

(2) Less than 125 cm from the mineral soil surface, if the clay content of the surface horizon is less than 20 percent and the particle-size class (of part or all of the upper 100 cm) is finer than sandy; *or*

(3) Less than 100 cm from the mineral soil surface, if the clay content of the surface horizon is 20 percent or more.

3. Has a CEC of 16 or less meq per 100 g clay[7] (by 1N NH_4OAc pH 7) and an ECEC of 12 or less meq per 100 g clay[8] (*sum of bases extracted with* 1N NH_4OAc pH 7 plus 1N KCl-extractable Al) in 50 percent or more of the thickness, starting at the point where the clay increase requirements are met and extending 100 cm below that point, or to a lithic, paralithic, or petroferric contact, if shallower.

4. Has a thickness of *either*

a. 30 cm or more; *or*

b. 15 cm or more if a lithic, paralithic, or petroferric contact occurs within 50 cm of the soil surface, with the kandic horizon constituting 60 percent or more of the vertical distance between 18 cm and the contact.

5. Has a texture of loamy very fine sand or finer.

6. Has a regular decrease in organic-carbon content with depth, *no* fine stratification, *and no* overlying layers more than 30 cm thick with fine stratification and/or organic carbon contents which decrease irregularly with depth."

615.82 Durargids and Paleargids

Many Argids with extremely well developed argillic horizons have a layer above the well developed horizon that is also part of the argillic horizon. Because these soils have a sharp clay increase within the argillic horizon rather than at its upper boundary, they have been excluded from the intended taxa. An example is the Tubac pedon, which was described by Guy Smith and Klaus Flach as typical of the Paleargid great group, but which did not actually meet the criteria for a Paleargid. The following changes are

NSTH 615.62, p. 615-241, item FAAB.4.b, line 2 (*Soil Taxonomy* p. 158). Following the word "(absolute)" add "at the upper boundary of the argillic horizon ".

NSTH 615.62, p. 615-241, item FAAC.1, line 3 (*Soil Taxonomy* p. 158). Following the word "boundary" add "or within some part ".

NSTH 615.62, p. 615-241, item FAAC.2, line 2 (*Soil Taxonomy* p. 158). Following the word "(absolute)" add "at the upper boundary of the argillic horizon ".

NSTH 615.62, p. 615-243, column 1, item 4.a, line 3 (*Soil Taxonomy* p. 158). Following the word "boundary" add "or within some part ".

NSTH 615.62, p. 615-243, column 1, item 4.b, line 2 (*Soil Taxonomy* p. 158). Following the word "(absolute)" add "at the upper boundary of the argillic horizon ".

Page 158, column 2, line 26. Following the word "boundary" add "or within some part ".

Page 158, column 2, line 27. Following the word "(absolute)" add "at the upper boundary of the argillic horizon ".

Page 158, column 2, line 38. Following the word "boundary" add "or within some part ".

Page 158, column 2, line 39. Following the word "(absolute)" add "at the upper boundary of the argillic horizon ".

Page 159, column 1, Haplargids, Definition, item 2.b, line 3. Following the word "boundary" add "or within some part ".

Page 159, column 1, Haplargids, Definition, item 2.b,

615.84 Reaction class exclusions

To provide consistency in the application of reaction classes, cindery and pumiceous families are added to the list of families for which reaction classes are not used.

Page 388, column 1, line 33. Following "sandy-skeletal," add "cindery, pumiceous,".

615.85 Calciudolls, Paleudolls, and calcic subgroups of Argiudolls and Hapludolls

The great group of Calciudolls is added, the definition of Paleudolls is modified, and calcic subgroups are added to the Argiudoll and Hapludoll great groups. These changes were requested, and supporting documentation provided, by M. S. Pazos, Argentina.

Page 295, Udolls. Key to great groups. Change items

"HGBH. Other Argiudolls that have a calcic horizon within 100 cm of the soil surface.
Calcic Argiudolls"

Change existing item HGBH to HGBI.

NSTH 615.62, p. 615-329, column 1 (*Soil Taxonomy* p. 296). Following item 6, add item 7 to read as follows:

"7. Do not have a calcic horizon within 100 cm of the soil surface."

Page 296, column 2, line 6. Preceding the section on Hapludolls, add the following sections:

"**Calciudolls**

These are the Udolls with a calcic horizon that has its upper boundary within 100 cm of the soil

HGBC. Other Calciudolls that have mottles with a chroma of 2 or less within 100 cm of the soil surface, and the mottled horizon is continuously saturated with water within 100 cm of the soil surface for 3 months or more in most years unless artificially drained.

Aquic Calciudolls

HGBD. Other Calciudolls.

Typic Calciudolls

Definition of Typic Calciudolls

Typic Calciudolls are Udolls that

1. Do not have a a lithic contact within 50 cm of the surface; *and*

2. Do not have the following combination of characteristics:

a. Cracks at some period in most years that are 1 cm or more wide at a depth of 50 cm, are at least 30 cm long in some part, and extend upward to the surface or to the base of an Ap horizon; *and*

b. A coefficient of linear extensibility (COLE) of 0.07 or more in a horizon or horizons at least 50 cm thick, and a potential linear extensibility of 6 cm or more in the upper 125 cm of the soil, or in the whole soil if a lithic or paralithic contact is deeper than 50 cm but shallower than 125 cm; *and*

c. More than 35 percent clay in horizons with a total thickness of more than 50 cm:

1. Cracks at some period in most years that are 1 cm or more wide at a depth of 50 cm, are at least 30 cm long in some part, and extend upward to the surface or to the base of an Ap horizon; *and*

2. A coefficient of linear extensibility (COLE) of 0.07 or more in a horizon or horizons at least 50 cm thick, and a potential linear extensibility of 6 cm or more in the upper 125 cm of the soil, or in the whole soil if a lithic or paralithic contact is deeper than 50 cm but shallower than 125 cm; *and*

3. More than 35 percent clay in horizons with a have total thickness of more than 50 cm.

Vertic Paleudolls

HGAB. Other Paleudolls that have a petrocalcic horizon within 150 cm of the surface.

Petrocalcic Paleudolls

HGAD. Other Paleudolls that:

1. Are calcareous throughout after the soil has been mixed to a depth of 18 cm; *and*

2. Have a calcic horizon within 100 cm of the soil surface.

Calcic Paleudolls"

NSTH 615.62, p. 615-331, column 1, Definition of Typic Paleudolls (*Soil Taxonomy* p. 298). Change the definition to read as follows:

"Definition of Typic Paleudolls

3. Do not have mottles with chroma of 2 or less within 100 cm of the soil surface if the mottled horizon is continuously saturated with water within 100 cm of the soil surface for 3 months or more in most years, or if the soil is artificially drained."

NSTH 615.62, p. 615-330, column 1 (*Soil Taxonomy* p. 296). Change item HGDJ to read as follows:

"HGDJ. Other Hapludolls that have a calcic horizon within 100 cm of the soil surface.

Calcic Hapludolls"

Change existing items HGDJ and HGDK to HGDK and HGDL, respectively.

NSTH 615.62, p. 615-331, column 1 (*Soil Taxonomy* p. 296). Following item 7, add item 8 as follows:

1. Do not have mottles with chroma of 2 or less in the upper 50 cm of the argillic horizon if the mottled horizon is saturated with water at some period when its temperature is more than 5^{0} C, or if the soil is artificially drained.

2. Do not have the following combination of characteristics:

a. Cracks at some period in most years that are 1 cm or more wide at a depth of 50 cm, are at least 30 cm long in some part, and extend upward to the surface or to the base of an Ap horizon; *and*

b. A coefficient of linear extensibility (COLE) of 0.07 or more in a horizon or horizons at least 50 cm thick, and a potential linear extensibility of 6 cm or

4. Do not have a calcic horizon within a depth of 100 cm of the soil surface.

615.86 Deletion of *micro* depth-of-soil class

The *micro* depth-of-soil class has not been useful for any known management concerns. The following changes are needed to delete this class.

Page 388, column 2. Delete all of section on "Depth of soil" and replace with the following:

"Depth of soil

Distinctions according to depth are made in some great groups and in arenic, grossarenic, and lithic subgroups. But some other soils should also be grouped according to depth at the family level, e.g., soils which at a shallow depth have a paralithic contact with weakly consolidated rock such as clay shale that is too compact for penetration by roots. The soil depth classes follow:

Shallow.--Two depths are considered shallow:

a. Less than 50 cm to the upper boundary of a duripan or of a petrocalcic or petrogypsic horizon, or to a lithic, paralithic, or petroferric contact. Used in all great groups of Alfisols, Andisols, Aridisols, Entisols, Inceptisols, Mollisols, Spodosols, and Ultisols. It is emphasized, however, that the adjective "shallow" is *not* used in the family names of lithic subgroups of these orders because it would be redundant.

b. Less than 100 cm to a lithic, paralithic, or petroferric contact. Used only in families of Oxisols."

615.87 Mollic intergrades of Aridisols

The following changes are made to correct and clarify the criteria for mollic intergrades in the Aridisol order.

NSTH 615.62, p. 615-241, column 2, item FAAB (*Soil Taxonomy* p. 158). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-242, column 1, item FAAF (*Soil Taxonomy* p. 158). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-242, column 2, item FAAH (*Soil Taxonomy* p. 158). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-243, Definition of Typic Durargids (*Soil Taxonomy* p. 158). Change item 3.b to read as follows:

"b. Do not have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*"

NSTH 615.62, p. 615-243, column 2, item FAEA (*Soil Taxonomy* p. 159). Change item 3 to read as follows:

"3. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13."

NSTH 615.62, p. 615-243, column 2, item FAEB (*Soil Taxonomy* p. 159). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-243, column 2, item FAEC (*Soil Taxonomy* p. 159). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-244, column 1, item FAED (*Soil Taxonomy* p. 159). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-244, column 1, item FAEF (*Soil*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-244, column 2, item FAEG (*Soil Taxonomy* p. 159). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13."

NSTH 615.62, p. 615-245, column 1, item FAEL (*Soil Taxonomy* p. 159). Change item 2 to read as

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-245, column 2, item FAEO (*Soil Taxonomy* p. 159). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-245, column 2, item FAEQ (*Soil Taxonomy* p. 159). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-246, column 1, item FAES (*Soil Taxonomy* p. 159). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-246, column 2, Definition of Typic Haplargids (*Soil Taxonomy* p. 159). Change item 5 to read as follows:

"*5.* Do not have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no lithic or paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a lithic or paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-248, column 1, item FACC (*Soil Taxonomy* p. 163). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-248, column 2, item FACD (*Soil Taxonomy* p. 163). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-248, column 2, item FACF (*Soil Taxonomy* p. 163). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-249, column 1, item FACH (*Soil Taxonomy* p. 163). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-249, column 1, item FACI (*Soil Taxonomy* p. 163). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is

NSTH 615.62, p. 615-249, column 2, item FACL (*Soil Taxonomy* p. 163). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-250, column 1, Definition of Natrargids (*Soil Taxonomy* p. 163). Change item 5 to read as follows:

"5. Do not have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no lithic or paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a lithic or paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-250, column 1, item FADA (*Soil Taxonomy* p. 166). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, in the upper 40 cm of the soil as follows:

a. 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

b. 0.15 or more, with a sand/clay ratio of 13 or more; *or*

c. 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-250, column 2, item FADB (*Soil Taxonomy* p. 166). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no petrocalcic horizon within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a petrocalcic horizon with an upper boundary at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-250, column 2, item FADD (*Soil Taxonomy* p. 166). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no petrocalcic horizon within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the petrocalcic horizon is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-251, column 1, item FADE (*Soil Taxonomy* p. 166). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no petrocalcic horizon within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

"2. Do not have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to clay, as follows:

a. In the upper 40 cm of the soil, if there is no petrocalcic horizon within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the petrocalcic horizon is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a petrocalcic horizon with an upper boundary at a depth between 18 and 40 cm,

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-251, column 1, item FADI (*Soil Taxonomy* p. 166). Change item 1 to read as follows:

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13;"

NSTH 615.62, p. 615-252, column 1, Definition of

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13."

NSTH 615.62, p. 615-252, column 2, item FBEB (*Soil Taxonomy* p. 168). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13."

NSTH 615.62, p. 615-252, column 2, item FBEC (*Soil Taxonomy* p. 168). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-253, column 1, item FBED (*Soil Taxonomy* p. 168). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-253, column 2, item FBEH (*Soil Taxonomy* p. 168). Change item 2 to read as follows:

"2. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-253, column 2, item FBEJ (*Soil*

NSTH 615.62, p. 615-253, column 2, item FBEK (*Soil Taxonomy* p. 168). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a

sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-254, column 2, Definition of

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13;"

NSTH 615.62, p. 615-254, column 2, item FBFA (*Soil Taxonomy* p. 171). Change item 3 to read as follows:

"3. A weighted average percentage of organic carbon, relative to the weighted average ratio of

[redacted]

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or more,

b. In the upper 18 cm of the soil, if the lithic contact is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-255, column 1, item FBFC (*Soil Taxonomy* p. 171). Change item 2 to read as follows:

"2. A weighted average percentage of organic

[redacted]

sand to clay, as follows:

a. In the upper 40 cm of the soil, if the lithic contact is at a depth of 40 cm or

"1. A weighted average percentage of organic

"2. A weighted average percentage of organic

a. In the upper 40 cm of the soil, if there is no paralithic contact within 40 cm,

(1) 0.60 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/clay ratio), or more, with a sand/clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if there is a paralithic contact at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/clay ratio of 13 or more; *or*

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-260, column 1, item FBCG (*Soil Taxonomy* p. 174). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-260, column 1, item FBCI (*Soil Taxonomy* p. 174). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if the top

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-260, column 2, Definition of Typic Durorthids (*Soil Taxonomy* p. 174). Change item 3.b to read as follows:

"b. Do not have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if the top of the duripan is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the duripan is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, as follows:

a. In the upper 40 cm of the soil, if the top of the petrocalcic horizon is at a depth of 40 cm or more,

(1) 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-261, column 1, item FBBD (*Soil Taxonomy* p. 176). Change item 1 to read as follows:

"1. A weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate-clay, as follows:

a. In the upper 40 cm of the soil, if the top of the petrocalcic horizon is at a depth of 40 cm or more,

(1) 0.60 or more, with a

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0

(2) 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *or*

b. In the upper 18 cm of the soil, if the top of the petrocalcic horizon is at a depth between 18 and 40 cm,

(1) 0.72 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

(2) 0.18 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

(3) 0.77-(0.046 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13; *and*"

NSTH 615.62, p. 615-262, column 2 (*Soil Taxonomy* p. 177). Change FBAA to read as follows:

"FBAA. Salorthids that have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, in the upper 40 cm of the soil as follows:

1. 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

2. 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

3. 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13."

NSTH 615.62, p. 615-262, column 2 (*Soil Taxonomy* p. 177). Change definition of Typic Salorthids to read as follows:

"Definition of Typic Salorthids

Typic Salorthids are the Salorthids that do not have a weighted average percentage of organic carbon, relative to the weighted average ratio of sand to noncarbonate clay, in the upper 40 cm of the soil as follows:

1. 0.60 or more, with a sand/noncarbonate-clay ratio of 1.0 or less; *or*

2. 0.15 or more, with a sand/noncarbonate-clay ratio of 13 or more; *or*

3. 0.64-(0.038 x sand/noncarbonate-clay ratio), or more, with a sand/noncarbonate-clay ratio between 1 and 13."

615.88 Corrections

The following changes are needed to correct errors and omissions in previous NSTH issues.

Page 86, Table 7, column 1, great group. To correct table 7 in accordance with amendments published in NSTH Issue 12, delete "Arents" from great-group column and replace, in the same column, with the following taxa:

"Torriarents
Udarents
Ustarents
Xerarents"

Page 86, Table 7, column 2. To correct table 7 in accordance with amendments published in NSTH Issue 13, delete the following suborder and great-group names:

"Andepts——————Cryandepts
Durandepts
Dystrandepts
Eutrandepts
Hydrandepts
Placandepts
Vitrandepts
Andaquepts"

Page 87, column 2, great group. To correct Table 7 in accordance with the amendment published in NSTH Issue 12 reestablishing Palehumults, add "Palehumults" between "Haplohumults" and "Plinthohumults".

Page 92, column 2, item F.1.b. Change lines 3 & 4 to read as follows: "throughout, 125 cm below the upper boundary of the argillic horizon or 180 cm below the surface of the soil, whichever is deeper;".

Page 364, column 1, Paleudults, Definition, item 3, line 3. Change "within 1.25 m" (or 125 cm) to "within 150 cm".

NSTH 615.62, p. 615-383, item GEBA (*Soil Taxonomy* p. 373). To correct an error in naming, change "Ruptic-Lithic-Xerochreptic Haploxerults" to "Lithic Ruptic-Xerochreptic Haploxerults".

NSTH 615.62, p. 615-366, item GADA (*Soil Taxonomy* p. 112). To correct an error in naming, change "Acric Kandiaquults" to "Acraquoxic Kandiaquults".

NSTH 615.62, p. 615-206, column 1, Ashy (*Soil Taxonomy* p. 384). To eliminate the overlap between ashy and medial families, change the definition of "ashy" to read as follows:

"Ashy - Rock fragments make up less than 35 percent by volume; thirty percent or more by weight of the fine-earth fraction is between 0.02 and 2.0 mm in diameter; and *either*:

a. If soil properties are andic, water content at 1500 kPa tension is less than 30 percent on undried samples and less than 12 percent on dried samples of the fine-earth fraction; *or*

b. If soil properties are not andic, a total of 30 percent or more of the 0.02-2.0 mm fraction by grain count consists of volcanic glass, glass aggregates, glass-coated grains, and other vitric volcaniclastics.

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